

### **REMARKS**

Claims 1-10 are pending in the present Application. No claims have been canceled, Claims 1-6 and 8-10 have been amended, and no claims have been added, leaving Claims 1-10 for consideration upon entry of the present Amendment.

#### Amendments to Claims

Claims 1-3, 5, 6, 8, and 9 have each been amended to further describe the claimed lithium manganese oxide as “having a higher irreversible capacity than the lithium-transition metal oxide”. Support for this amendment can be found in the Specification as filed at least on p. 8, lines 27-30.

Claims 4 and 10 have each been amended to correct an inadvertent typographical error as described below, and to replace the term “manganese” with “transition metal”, also as described below. Support for these amendments can be found at least in the Specification on p. 10, line 29 to p. 11, line 6.

Claims 1, 5, and 6 have been amended to remove nickel (Ni) from the markush group. No new matter has been entered with these amendments.

#### Objections to Claims/Amendments to Claims

Claims 4 and 10 have been amended to correct an inadvertent typographical error as noted by the Examiner, and properly recite the term “at least” before the markush group of lithium transition metal oxides. No new matter has been included with these amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

#### Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 4 and 10 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner indicates that several of the recited compounds in the markush group do not contain manganese. Applicants note the error in the claims and, as suggested by the Examiner, have amended these claims to correctly

recite that the compounds are lithium transition metal oxides, not lithium manganese oxides, support for which can be found at least in the Specification as filed on p. 10, line 29, to p. 11, line 6.

As the amendments correctly recite a lithium transition metal oxide, the claims should now be acceptable to the Examiner. Reconsideration and withdrawal of the rejection are respectfully requested.

#### Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1, 2, 4-8, and 10 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Japanese Patent Publication No. JP 2002-100357 (“Manabu”).

Applicants respectfully traverse this rejection.

Manabu discloses a positive active material layer comprising a lithium transition metal multiple oxide with an R-3-m rhombohedral structure, with empirical formula  $\text{Li}_x\text{Ni}_y\text{Mn}_{1-y-z}\text{M}_z\text{O}_2$ , where  $0.40 \leq y \leq 0.60$ ,  $0.9 \leq x \leq 1.2$ , and  $0 \leq z \leq 0.2$ . Manabu, [0009]. An R-3-m rhombohedral structure (where M is cobalt) consists of lithium cobalt multiple oxide expressed with  $\text{Li}_x\text{CoO}_2$ , where  $0.9 \leq x \leq 1.1$ . Manabu, [0009] and [0011].

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

Manabu fails to disclose all elements of the instant claims, fails to provide a suggestion or incentive that would lead one skilled in the art to modify Manabu to provide the invention of instant claim 1, and further, fails to do so with a reasonable expectation for the success of the modification.

Manabu discloses a lithium nickel manganese composite oxide ( $\text{Li}_x\text{Ni}_y\text{Mn}_{1-y-z}\text{M}_z\text{O}_2$ ) which necessarily contains nickel (i.e., where  $0.40 \leq y \leq 0.60$ ). The lithium manganese oxide of instant Claims 1 and 5 do not contain nickel. Furthermore, as disclosed in Manabu, for a lithium nickel manganese composite oxide where  $y$  is less than 0.4, a stable R-3m rhombohedral structure cannot be obtained, and for a value of  $y$  greater than 0.6, the safety of the secondary battery may be compromised. Therefore,  $y$  for such compounds is desirably in the range of 0.4-0.6. Manabu, paragraph [0010]. The courts have held that “[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The courts have also held that “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.” *In re Ratti* 270 F. 2d 810, 123 USPQ 349 (CCPA 1959). As stated above, the lithium manganese oxide of amended instant claim 1 does not contain nickel at all. To amend Manabu by removing any nickel would therefore remove any advantageous properties of the resulting composition of Manabu, from the perspective of the practitioner. Manabu would in this way not achieve a stable R-3-m rhombohedral structure. Consequently, there is no teaching in Manabu that would lead one skilled in the art to so modify Manabu to remove nickel, and further, given the teachings of Manabu that too low a nickel content would not provide the required structure, to do so would not be expected to meet with a reasonable expectation for success.

For at least these reasons therefore, Manabu fails to teach all limitations of the instant claims, fails to provide a suggestion or incentive that would lead one skilled in the art to modify the composition of Manabu by removing all nickel, and as a result would not provide a reasonable expectation that the composition would be successful based on the disclosure that the structure would change.

Reconsideration and allowance of Claims 1 and 5 and their dependents are therefore respectfully requested.

Claims 3 and 9 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Manabu in view of U.S. Patent No. 5,609,975 (“Hasegawa”).

Applicants respectfully traverse this rejection.

Hasegawa discloses a positive active material having the empirical formula  $\text{Li}_x\text{A}_{1-y}\text{M}_y\text{O}_2$  where A is Mn, Co, or Ni, A is a metal atom including Ni, Cr, V, Fe, Co, Mn, Cu, etc.,  $0.05 \leq x \leq 1.1$  and  $0 \leq y \leq 0.5$ . Hasegawa, Abstract. A positive electrode includes the positive active material, a binder of a fluorocarbon resin that is soluble in a solvent, a conductive agent, and a current collector. Hasegawa, Col. 2, lines 21-36, Col. 3, lines 29-42; and Col. 3, line 55 to Col. 4, line 38. The binders “enable preparation of high performance positive electrodes of lithium secondary batteries.” Col. 3, lines 59-61.

Manabu in view of Hasegawa does not disclose a cathode active material comprising a combination of a lithium transition metal oxide containing a lithium manganese oxide additive, where the lithium manganese oxide has a higher irreversible capacity than the lithium transition metal oxide, and does not suggest the combination in any way that would lead one skilled in the art to do so, with a reasonable expectation of success

Hasegawa discloses only that the positive active materials are combined with a fluoropolymer with good solubility for dispersion, but fails to suggest the combination of lithium manganese oxide and lithium transition metal oxide. Specifically, while as asserted by the examiner, the empirical formula of Hasegawa broadly discloses a number of compositions, including for example  $\text{LiCr}_{0.1}\text{Mn}_{0.9}\text{O}_2$ , there is no disclosure that the positive active material which may include such a subcombination of limitations is combined with other lithium mixed transition metal oxides in Hasegawa. Hasegawa only generically teaches a single compound for use as a positive active material, e.g.,  $\text{LiNiO}_2$ , or  $\text{LiCoO}_2$  or  $\text{LiMn}_2\text{O}_4$ . Col. 3, lines 21-28; Col. 5, lines 13-19. Hence, there is no suggestion that would lead one to combine a compound such as  $\text{LiCr}_{0.1}\text{Mn}_{0.9}\text{O}_2$  as claimed in instant Claims 3 and 9, with a positive active material with a lower capacity to provide a main cathode active material, as neither Hasegawa nor Manabu discloses nor suggests that such a compound can be used as an additive for the cathode active material (i.e., where Manabu teaches away from the use of a non-nickel containing lithium transition metal compound). As claimed in the instant claims, lithium manganese oxide (which has the higher irreversible capacity) is included an additive

for the lithium-transition metal oxide, in order to improve over-discharge properties, to prevent the battery capacity from being significantly reduced after over-discharge, and to maintain a high level of capacity restorability after over-discharge.

The mechanism of the above effect by the lithium manganese oxide when used as an additive for the lithium-transition metal oxide having a lower irreversible capacity than lithium manganese oxide, is supported in the descriptions on page 2, line 7 to page 3, line 22; page 5, lines 1-12; and page 6, line 23 to page 8, line 30 of the English specification in the subject application.

As described above, the invention as claimed in Claims 3 and 9 differs from Manabu in view of Hasegawa in the composition of cathode active material, the mechanism defining the role of the additive, and the effect of the additive, and there is therefore no suggestion or incentive that would lead one skilled in the art to so modify the combination of Manabu and Hasegawa. Reconsideration and allowance of the claims is respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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